

Supporting information

Interconnected channels through polypropylene and cellulose

acetate by utilizing lactic acid for stable separators

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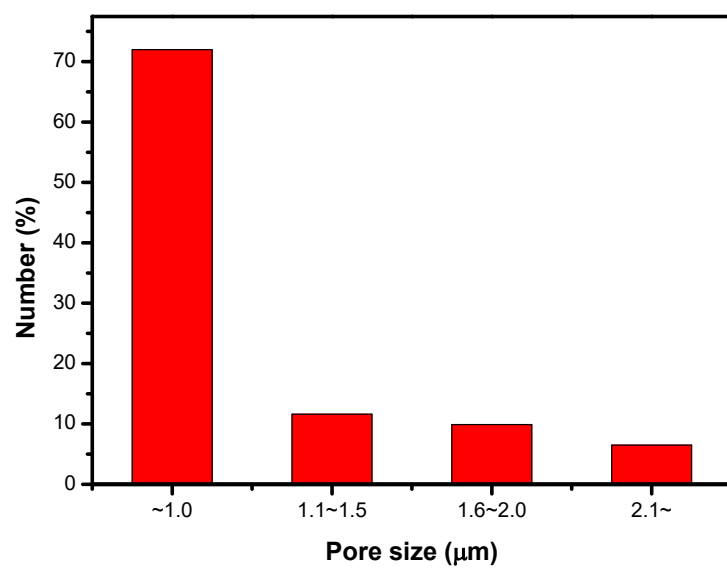


Figure S1. Size distribution plot of the pore size

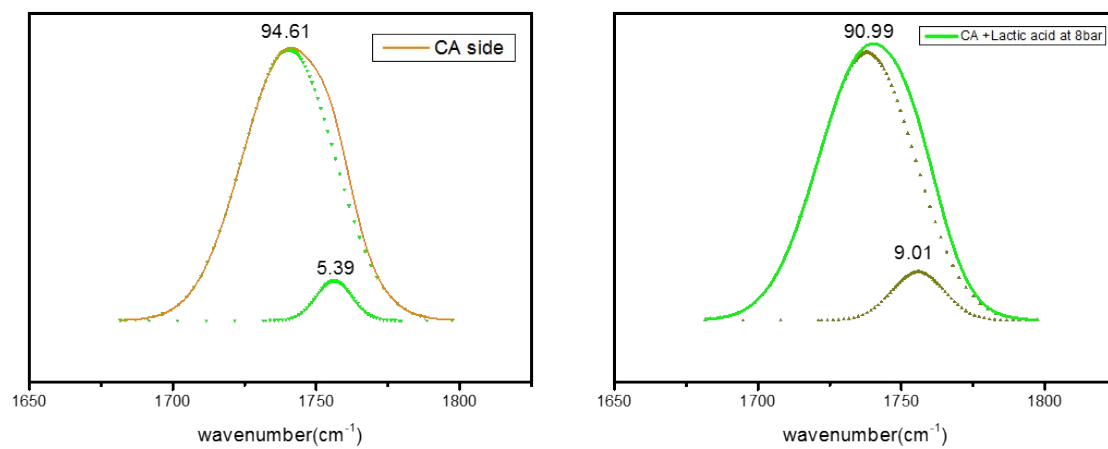


Figure S2 Deconvolution of CA side in CA-lactic acid film (C=O peak)

Figure S3. The comparison of area ratio (C=O peak)

	CA-lactic acid at 8 bar	CA side (CA-PP)
1737~1740 cm⁻¹	90.99%	94.61%
1755~1756 cm⁻¹	9.01%	5.39%

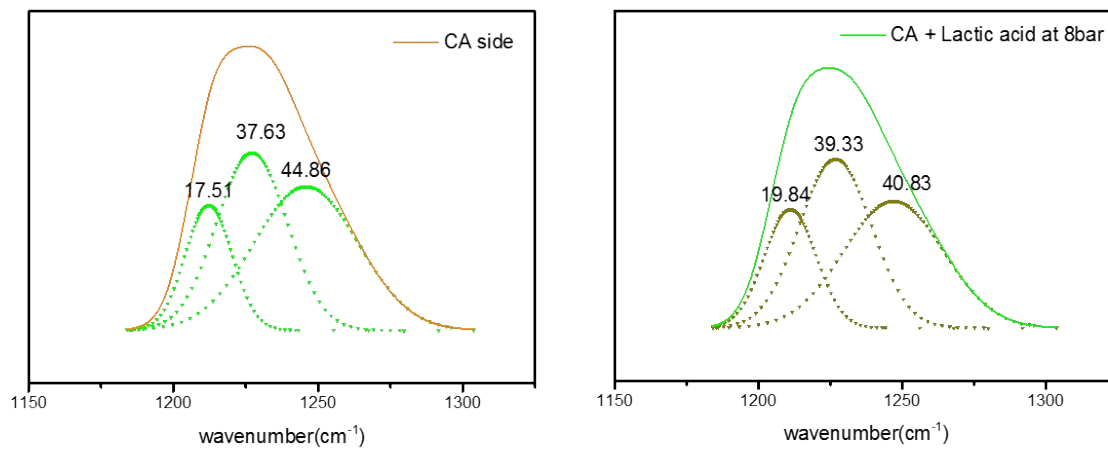


Figure S4 Deconvolution of CA side in CA-lactic acid film (C-O-C peak)

Figure S5. The comparison of area ratio (C-O-C peak)

	CA-Lactic acid at 8bar	CA side (CA-PP)
1211~1212 cm⁻¹	19.84%	17.51%
1226~1227 cm⁻¹	39.33%	37.63%
1245~1247 cm⁻¹	40.83%	44.86%

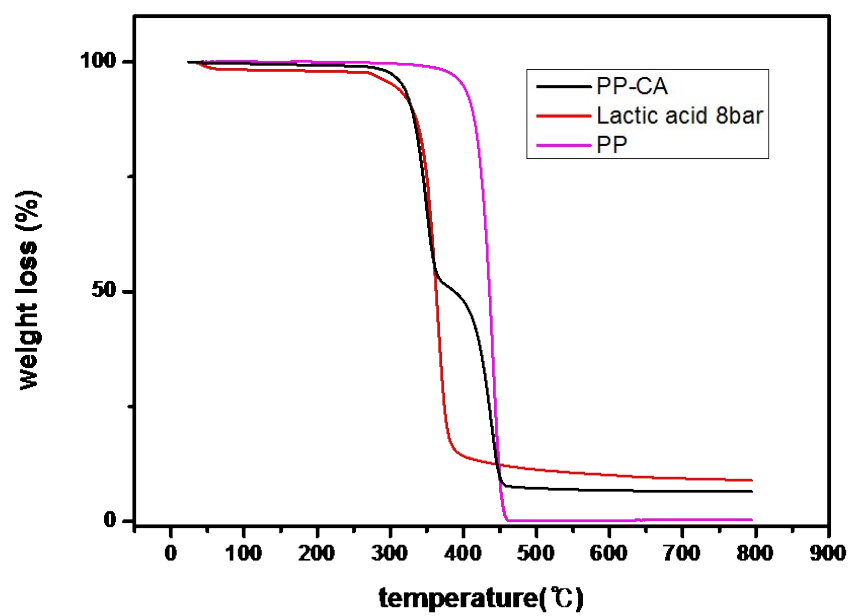


Figure S6. TGA data

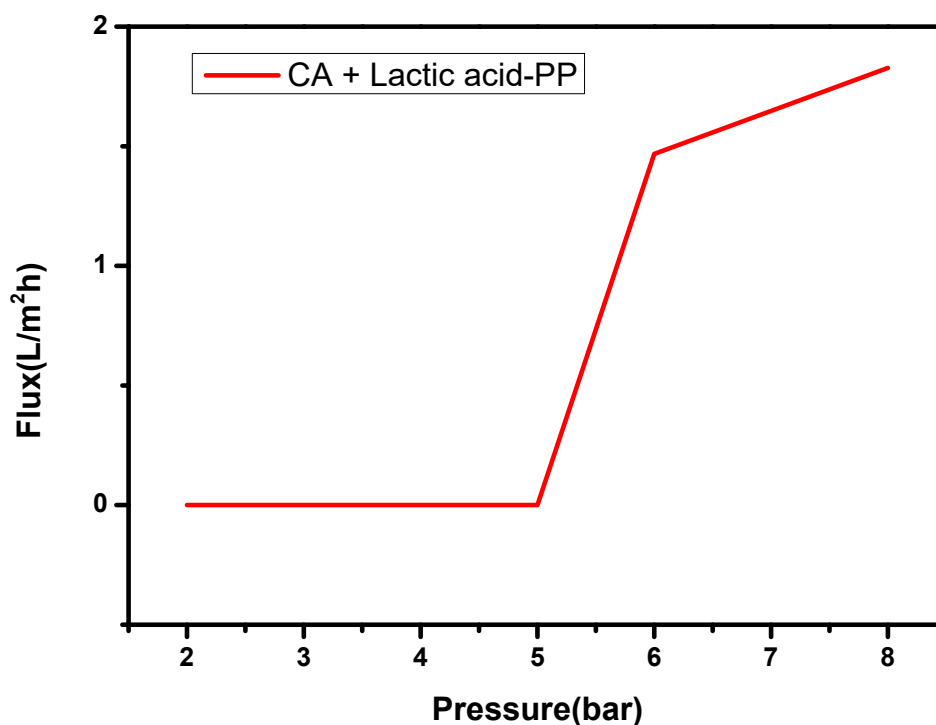


Figure S7. Water flux data

When the film was prepared, the longer the drying time was, the larger the threshold was, and it was observed that the pores were formed at 8 bar when the film was dried for 30 minutes. The average flux measured at 8 bar was 1.83 L/m²h. Once a channel was formed between the two polymers, it was confirmed that the water flux had the same water flux even after 7 hours. The reason that the flux slope rapidly increased at 5~6 bar was attributable to that the pores were formed as most of the lactic acids were rapidly removed, and after that, since small amounts of lactic acid remained, a gradual slope was observed. It was experimentally confirmed that the pores were formed in the single CA film by water pressure at about 2-3bar, and the pores were formed in 4 bar by water pressure in neat PP. Compared with these results, the CA-PP separator was evaluated to have better physical stability than the existing CA and PP separators since pores were formed when a higher pressure was applied.